5.3 Environmental Radiation Protection

Safety Criterion: 5.3 – 1

An Environmental Radiological Protection Program shall be prepared and submitted to the regulator.

The Environmental Radiological Protection Program (ERPP) shall address the following elements, as appropriate:

(1) the identity of existing and anticipated types of activities and areas of the site subject to the ERPP;
(2) the measures to be used to implement the ERPP;
(3) the methods to be used to monitor, report, and record compliance with the ERPP;
(4) models and methods used for dose assessment including bioaccumulation and dose-conversion factors;
(5) an As Low As is Reasonably Achievable (ALARA) Program;
(6) effluent and environmental monitoring including:
  (i) sources of airborne emissions,
  (ii) sources of discharges in liquid waste streams,
  (iii) effluent monitoring,
  (iv) environmental surveillance,
  (v) meteorological data acquisition, and
  (vi) preoperational evaluation;
(7) ground water protection;
(8) radiological protection in the management of radioactive waste;
(9) controls on the release of materials; and
(10) property containing residual radioactive materials.

Implementing Codes and Standards:

~~G-10 CFR 835/B2 Occupational ALARA Program [Implementing St andard for Item 5, ALARA Program, above].~~

~~[Implementing Standards for the remaining elements of the ERPP to be determined.]~~

ANSI/ISO-14001-1996, *Environmental Management Systems – Specifications with guidance for use*

Regulatory Basis:

DE-AC06-96RL13308 Part I Section C.5 Table S4-1
DOE/RL-96-0006 4.3.2.1 Radiation Protection-Radiation Practices
DOE/RL-96-0006 4.3.2.2 Radiation Protection-Procedures and Monitoring

BNFL comment: ISO 14001 is identified as the Implementing Standard for development of the ERPP Program. G-10 CFR 835/B2 the Implementing Standard specific to the development of the ALARA Program is identified as an Implementing Standard in the new Safety Criterion 5.3-2, which further defines the ALARA Program.

Safety Criterion: 5.3 - 2

The ALARA Program shall ensure that releases of radioactive materials to the environment and exposures to the public during normal operations shall be kept ALARA and within prescribed limits.

Implementing Codes and Standards:
G-10 CFR 835/B2 Occupational ALARA Program

Regulatory Basis:
DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.2 Radiation Protection-Radiation Protection Features
WAC 173-480 Ambient Air Quality Standards and Emission Limits for Radionuclides Location: Part 050 (1)

BNFL comment: This is a new Safety Criterion expanding upon the program element of SC 5.3-1 item 5 requiring an ALARA Program. This Safety Criterion implements portions of DOE/RL-96-0006 Top Level Principles 3.2 and 4.2.3.2 for Environmental Radiation Protection.

Safety Criterion: 5.3 - 3

A waste management program shall ensure compliance with all applicable laws and regulations. The waste management program shall also ensure that the radiological impact to the general public and environment due to radioactive wastes arising from TWRS-P Facility operation shall be ALARA.

Implementing Codes and Standards:
IAEA Safety Series No. 50-SG-011, *Operational Management for Radioactive Effluents and Wastes Arising in Nuclear Power Plants*,
ANSI/ISO-14001-1996, *Environmental Management Systems – Specifications with guidance for use*

Regulatory Basis:
DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.2 Radiation Protection-Radiation Protection Features

BNFL comment: This is a new Safety Criterion expanding upon the program element of SC 5.3-1 item 8 requiring radiological protection in the management of facility generated wastes. This Safety Criterion implements portions of DOE/RL-96-0006 Top Level Principles 3.2 and 4.2.3.2 for Environmental Radiation Protection.

Safety Criterion: 5.3 – 4

Equipment shall be designed and installed to monitor and maintain control over radioactive materials in gaseous and liquid effluents produced during normal operations, including anticipated operational occurrences. ~~Releases of radioactive materials to the environment and exposures to the public during normal operations shall be kept ALARA and within prescribed limits.~~

Implementing Codes and Standards:

40 CFR 52 Appendix E Performance Specifications and Specification Test Procedures for Monitoring Systems for Effluent Stream Gas Volumetric Flow Rate
40 CFR 60 Appendix A, Methods 1, 1a, 2, 2a, 2c, 2d, 4, 5,and 17
ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities
ANSI N42.18-1980 (R 1991) Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents
ANSI N323 Radiation Protection Instrumentation Test and Calibration
ASME/ANSI AG-1, Code on Nuclear Air and Gas Treatment
ASME/ANSI N509, Nuclear Power Plant Air-Cleaning Units and Components,
ASME/ANSI N510, Testing of Nuclear Air Cleaning Systems
ACGIH 1988, Industrial Ventilation, A Manual of Recommended Practice, 20th Edition, American Conference of Governmental Industrial Hygienists.
ERDA 76-21, Nuclear Air Cleaning Handbook
~~WAC 246-247-120 Appendix B BARCT Compliance Demonstration~~

Regulatory Basis:

DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.2 Radiation Protection-Radiation Protection Features
~~*WAC 173-480 Ambient Air Quality Standards and Emission Limits for Radionuclides Location: Part 050 (1)*~~
WAC 246-247 Radiation Protection - Air Emissions Location: Part 075
WAC 246-247 Radiation Protection - Air Emissions Location: Part 110

BNFL Comment: The last sentence of this Safety Criterion is superceded by the addition of SC 5.3-2 addressing the Environmental ALARA Program which implements the Top Level Objective 3.2 and Principle 4.2.3.2 for environmental radiation protection. With this change, BARCT is no longer required as an Implementing Standard for this Safety Criterion. BARCT is addressed as an Implementing Standard under SC 5.3-5.

Safety Criterion: 5.3 - 5

All new construction and significant modifications of air emission units shall utilize best available radionuclide control technology (BARCT).

Implementing Codes and Standards:

WAC 246-247-120 Appendix B BARCT Compliance Demonstration
ASME/ANSI AG-1, Code on Nuclear Air and Gas Treatment
ASME/ANSI N509, Nuclear Power Plant Air-Cleaning Units and Components,
ASME/ANSI N510, Testing of Nuclear Air Cleaning Systems
ANSI N13.1, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities
ANSI N42.18, Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents
ERDA 76-21, Nuclear Air Cleaning Handbook
ACGIH 1988, Industrial Ventilation, A Manual of Recommended Practice, 20th Edition, American Conference of Governmental Industrial Hygienists.
40 CFR 60 Appendix A, Methods 1, 1a, 2, 2a, 2c, 2d, 4, 5,and 17

Regulatory Basis:

WAC 173-480 Ambient Air Quality Standards and Emission Limits for Radionuclides Location: Part 060
WAC 246-247 Radiation Protection - Air Emissions Location: Part 040 (3)

Safety Criterion: 5.3 - 6

~~Activities shall be conducted in a manner such that radionuclides in liquid wastes discharged into sanitary sewers shall:~~

~~(1) consist only of soluble materials or readily dispersed biological materials;~~
~~(2) be treated by the best available radionuclide control technology (BARCT) process to reduce the concentration level to less than five times the DCG values for liquids, if the average monthly level otherwise would be greater than five times the DCG value at the point of discharge; and~~
~~(3) not result in an annual discharge (above background) into public sewers in excess of~~
~~(a) 5 Ci (200 GBq) of tritium,~~
~~(b) 1 Ci (37 GBq) of carbon-14, and~~
~~(c) 1 Ci (37 GBq) total of all other radionuclides.~~

~~The discharge of liquid wastes into a sanitary sewer system shall not be subject to above requirements (2) and (3) if the system provides treatment in accordance with an approved ERPP, prior to the discharge of liquid waste; and sludge from the system is disposed of in accordance with applicable Federal regulations.~~

Activities shall be conducted in such a manner that no radioactive material is discharged into sanitary sewers. Exempt from this Safety Criterion are trace radioactive materials present in:

(1) readily soluble waste such as kitchen waste from breakrooms, custodial cleaning solutions, or other materials of similar non-TWRS-P Facility process origin, and;
(2) biological waste (solid and liquid human waste) which is readily dispersed in water.

Also exempt from this Safety Criterion are excreta from individuals undergoing medical diagnosis or therapy with radioactive materials.

Implementing Codes and Standards:

IAEA Safety Series No. 50-SG-011, *Operational Management for Radioactive Effluents and Wastes Arising in Nuclear Power Plants*.

Regulatory Basis:

DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.2 Radiation Protection-Radiation Protection Features

BNFL comment: This Safety Criterion was revised to clarify that discharges of TWRS-P Facility process radioactive material to sanitary sewers are prohibited The original criterion was determined to be more appropriate to a facility such as a laboratory or hospital where discharges of low levels of process-related radioactivity may legally occur. With this revision, the Safety Criterion is more restrictive than the original criterion and thus provides adequate safety. Additionally, the revised criterion acknowledges that an approved ERPP (as required by SC 5.3-1) will be in place and compliance to laws and regulations is requires thus negating the need for exception provisions of the final paragraph and sub-items (2) and (3).

Safety Criterion: 5.3 - 7

Liquid discharges from the facility, other than sanitary sewer discharges, shall comply with ALARA process requirements, be treated by the best available technology, and not result in release of settleable solids to surface waters for streams exceeding 5 pCi/g for alpha-emitting radionuclides, and/or 50 pCi/g for beta-emitting radionuclides.

Note: The TWRS-P design does not include provisions for liquid waste discharges, other than sanitary sewer discharges. Therefore, Implementing Codes and Standards are not required. If the TWRS-P design changes such that liquid discharges result, an SRD revision will be prepared.

Safety Criterion: 5.3 - 8

Controls on the release of materials and property containing residual radioactive material shall be established.

Implementing Codes and Standards:
10 CFR 835, Occupational Radiation Protection, Appendix D (ad hoc)

Note: The Appendix D values will be used as surface contamination criteria for determining the suitability of releasing material from radiologically controlled areas. These criteria are not applicable to materials potentially contaminated throughout their volume. Because the TWRS-P Facility process feed is a mixed waste, any items that are determined to be contaminated, will also be assumed to be a mixed waste (i.e., containing a State of Washington dangerous waste). Rather than determine the quantities of dangerous wastes present, these materials will be disposed of as mixed wastes.

Regulatory Basis:
DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.1 Radiation Protection-Radiation Protection Practicess

BNFL comment: This is a new Safety Criterion expanding upon the program element of SC 5.3-1 items 9 and 10 requiring controls on the release of radiologically contaminated material and property.

5.4 Environmental Radiological Monitoring

Safety Criterion: 5.4 – 1

Each source shall have capability for independent effluent emission testing as follows:
(1) Sampling ports adequate for test methods applicable to each source.
(2) Safe sampling platform(s).
(3) Safe access to sampling platform(s).
(4) Utilities for sampling and testing equipment.
(5) Any other facilities deemed necessary to safely and properly test a source.

Implementing Codes and Standards:
ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities

Regulatory Basis:
40 CFR61 National Emission Standards for Hazardous Air Pollutants Location: 13
WAC 246-247 Radiation Protection - Air Emissions Location: Part 075 (10)
WAC 246-247 Radiation Protection - Air Emissions Location: Part 075 (9)

Safety Criterion: 5.4 -– 2

Nonpoint and fugitive emissions of radioactive material shall be monitored.

Implementing Codes and Standards:
ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities

Regulatory Basis:
WAC 246-247 Radiation Protection - Air Emissions Location: Part 075 (8)

BNFL Comment: ANSI N 13.1 is added as an Implementing Standard to describe how the monitoring will be performed.

Safety Criterion: 5.4 – 3

Direct measurements shall be made, to the extent practicable, to obtain information characterizing source terms, exposures, exposure modes, and other information needed in evaluating doses.

Implementing Codes and Standards:
ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities

Regulatory Basis:
WAC 246-221 Radiation Protection Standards Location: 070 (1)

Safety Criterion: 5.4 - 4

When the effluents from a single source, or from two or more sources subject to the same emission standards, are combined before being released to the atmosphere, a monitoring system shall be installed on each effluent or on the combined effluent. If two or more sources are not subject to the same emission standards, a separate monitoring system shall be installed on each effluent. If the applicable standard is a mass emission standard and the effluent from one source is released to the atmosphere through more than one point, a monitoring system shall be installed at each emission point.

Implementing Codes and Standards:

ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities

Regulatory Basis:

40 CFR61 National Emission Standards for Hazardous Air Pollutants Location: 14 (d)

Safety Criterion: 5.4 – 5

Equipment and procedures used for the continuous monitoring of radioactive air emissions shall conform, to applicable guidance .

Implementing Codes and Standards:

40 CFR 52 Appendix E Performance Specifications and Specification Test Procedures for Monitoring Systems for Effluent Stream Gas Volumetric Flow Rate
40 CFR 60 Appendix A, Test Methods 1, 1a, 2, 2a, 2c, 2d, 4, 5,and 17
40 CFR 61 Appendix B, Test ~~Methods~~ Method 114
~~40 CFR 61 Appendix E Compliance Procedures Methods for Determining Compliance with Subpart I~~
ANSI N13.1-1969 (R 1993) Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities
ANSI N323 Radiation Protection Instrumentation Test and Calibration
ANSI N42.18-1980 (R 1991) Specification and Performance of On-Site Instrumentation for Continuously Monitoring Radioactivity in Effluents

Regulatory Basis:

~~*40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 103*~~
~~*40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 107*~~
40 CFR61 National Emission Standards for Hazardous Air Pollutants Location: 93
WAC 246-247 Radiation Protection - Air Emissions Location: Part 075 (2)

BNFL Comment: Subpart I references deleted from the Implementing Codes and Standards and Regulatory Basis, Subpart I is applicable to NRC licensed facilities and was used as an "equivalent" regulation.

Safety Criterion: 5.4 – 6

Computer codes or procedures used to determine the offsite total effective dose equivalent from airborne emissions shall be EPA approved.

Implementing Codes and Standards:
ANSI/ISO-14001-1996, Environmental Management Systems - Specification with Guidance for Use
~~40 CFR 61.93 Emission Monitoring and Text Procedures~~
~~WAC-246-247-085 Compliance determination for existing emission units and facilities~~
Regulatory Basis:
~~*40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 103*~~
40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 93
WAC 246-247 Radiation Protection - Air Emissions Location: Part 085 (2)

BNFL Comment: Subpart I references deleted from the Regulatory Basis Subpart I is applicable to NRC licensed facilities and was used as an "equivalent" regulation. ISO 14001 is an appropriate Implementing Standard for this Safety Criterion. ISO 14001 requires compliance to applicable laws and regulations and requires implementing an environmental management system to achieve compliance with these requirements.

Safety Criterion: 5.4 - 7

Compliance with the annual dose limit for individual members of the public (100 mrem/yr from all sources) shall be shown by:

(1) Demonstrating by measurement or calculation that the total effective dose equivalent to the individual likely to receive the highest dose from the operation does not exceed the annual dose limit; or

(2) Demonstrating that:

(a) The annual average concentrations of radioactive material released in gaseous and liquid effluents at the boundary of the unrestricted area do not exceed the values specified in Table II of WAC246-221-290; and

(b) If an individual were continuously present in an unrestricted area, the dose from external sources would not exceed 0.002 rem in an hour and 0.05 rem in a year.

Implementing Codes and Standards:
ANSI/ISO-14001-1996, Environmental Management Systems - Specification with Guidance for Use
~~40 CFR 61.93 Emission Monitoring and Text Procedures~~
~~WAC-246-247-085 Compliance determination for existing emission units and facilities~~
Regulatory Basis:
40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 93
WAC 246-221 Radiation Protection Standards Location: 070 (2)
WAC 246-247 Radiation Protection - Air Emissions Location: Part 085 (1)

BNFL Comment: ISO 14001 is an appropriate Implementing Standard for this Safety Criterion. ISO 14001 requires compliance to applicable laws and regulations and requires implementing an environmental management system to achieve compliance with these requirements.

Safety Criterion: 5.4 – 8

Compliance with the public air emission standard shall be determined by calculating the highest effective dose equivalent to any member of the public at any offsite point where there is a residence, school, business or office.

The determination of compliance shall include all radioactive air emissions resulting from routine and nonroutine operations for the past calendar year.

Implementing Codes and Standards:
ANSI/ISO-14001-1996, Environmental Management Systems - Specification with Guidance for Use
~~40 CFR 61.93 Emission Monitoring and Text Procedures~~
~~WAC-246-247-085 Compliance determination for existing emission units and facilities~~

Regulatory Basis:
40 CFR61 National Emission Standards for Hazardous Air Pollutants Location: 94
WAC 246-247 Radiation Protection - Air Emissions Location: Part 085 (3)

BNFL Comment: ISO 14001 is an appropriate Implementing Standard for this Safety Criterion. ISO 14001 requires compliance to applicable laws and regulations and requires implementing an environmental management system to achieve compliance with these requirements.

Safety Criterion: 5.4 – 9

Records sufficient to demonstrate compliance with the dose limit for individual members of the public shall be maintained. Records must document the source of input parameters including the results of all measurements upon which they are based, the calculations and/or analytical methods used to derive values for input parameters, and the procedure used to determine compliance. This documentation should be sufficient to allow an independent auditor to verify the accuracy of the determination made concerning the facility's compliance.

Implementing Codes and Standards:
ANSI/ISO-14001-1996, Environmental Management Systems - Specification with Guidance for Use
~~WAC-246-221-230 Records important to radiation safety~~
~~WAC-246-247-080 Inspections, reporting, and recordkeeping~~

Regulatory Basis:
~~*40 CFR 61 National Emission Standards for Hazardous Air Pollutants Location: 105*~~
40 CFR61 National Emission Standards for Hazardous Air Pollutants Location: 95
WAC 246-247 Radiation Protection - Air Emissions Location: Part 080

BNFL Comment: Subpart I references deleted from the Regulatory Basis Subpart I is applicable to NRC licensed facilities and was used as an "equivalent" regulation. ISO 14001 is an appropriate Implementing Standard for this Safety Criterion. ISO 14001 requires compliance to applicable laws and regulations and requires implementing an environmental management system to achieve compliance with these requirements.

Safety Criterion: 5.4 – 10

An environmental surveillance program shall be developed and implemented to include:
(1) Meteorological data acquisition (Note 1),
(2) Pre-operational evaluation (Note 2),
(3) Near-Facility Monitoring (Note 3), and
(4) Ground Water Protection (Note 4).

Implementing Codes and Standards:
ANSI/ISO-14001-1996, Environmental Management Systems - Specification with guidance for use
IAEA Safety Series No 41, *Objectives and Design of Environmental Monitoring Programmes for Radioactive Contaminants*,

Note:
1. BNFL-5193-ID-03, *Tank Waste Remediation System Privatization Project Interface Control Document*, Revision 2, *ICD-22 between DOE and BNFL Inc. for Air Emissions*, Table 2 states that DOE will maintain the Hanford Site Air Operating Permit (AOP) and provide access to meteorological data.

2. BNFL-5193-ID-03, *Tank Waste Remediation System Privatization Project Interface Control Document*, Revision 2, *ICD-09 Between DOE and BNFL Inc. for Land Siting*, Table 1, describes specific interfaces responsibilities for BNFL Inc. and for the DOE. Item 12 of the table requires that BNFL Inc. perform any additional site characterization work beyond that which was performed by the DOE. Provisions for monitoring the construction site for radioactive contamination is an activity outside the scope of the Radiation Protection Program (RPP) for design. Prior to activities at the facility site which could release radioactive contamination, the RPP will be revised and submitted for DOE review and approval. The revised RPP will describe the plans and measures for compliance with the survey and contamination control requirements of 10 CFR 835.

3. As described in BNFL-5193-ID-03, *Tank Waste Remediation System Privatization Project Interface Control Document*, Revision 2, *ICD-22 between DOE and BNFL Inc. for Air Emissions*, DOE will continue to operate site and near-facility monitoring networks in the vicinity of the TWRS-P Facility site. Additional monitoring which is required will be provided by BNFL Inc. If additional monitoring is required, it will be performed consistent with the Hanford Site near-facility monitoring program for inclusion in site annual reports (example, HNF-EP-0573-6, *Hanford site Near-Facility Environmental Monitoring Annual Report, Calendar Year 1997*).

4. BNFL-5193-ID-03, *Tank Waste Remediation System Privatization Project Interface Control Document*, Revision 2, *ICD-09 between DOE and BNFL Inc. for Land Siting*, Section 3.3, Ground Water Monitoring Wells, states that that the DOE will "…close groundwater monitoring well E25-32 prior to the start of site work…" There is no liquid discharge to the environment from TWRS-P Facility operations. Transfer piping to the Effluent Treatment Facility is by means of a three-inch pipe encased in a 6-inch pipe. Potential leakage from the transfer pipe is contained, and collected by the outer pipe. Accidental release of the inner pipe contents would be detected by the transfer pipe leak detection equipment. If both inner and outer pipes failed, such leakage could result in soil contamination which would be remediated prior to any contamination reaching the ground water.

Regulatory Basis:
DOE/RL-96-0006 3.2 Radiation Protection Objective
DOE/RL-96-0006 4.2.3.1 Radiation Protection-Radiation Protection Practices

BNFL comment: This is a new Safety Criterion expanding upon the program element s of SC 5.3-1 items 6 and 7. This Safety Criterion implements portions of DOE/RL-96-0006 Top Level Principles 3.2 and 4.2.3.1 for Environmental Radiation Protection.

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